

The gravity field of Comet 67 P/Churyumov-Gerasimenko before and after perihelion

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The ESA-Rosetta spacecraft arrived at comet 67P/Churyumov-Gerasimenko on August, 6th 2014, orbited the comet in October and November 2014 at distances between 10 and 30 km in order to prepare the landing of Philae, accompanied the comet during its perihelion at the Sun and finally landed on the comet on September, 30th 2016. The orbit of Rosetta has been changed from August 2016 on and until the end of the operational lifetime of the spacecraft. A series of elliptical orbits took the spacecraft closer and closer to the comet.

The trajectory in 2014 allowed the precise estimate of the mass of the comet before perihelion from Doppler and ranging data with the Radio Science Experiment RSI onboard Rosetta. With the trajectory in 2016 at very close distances it was possible with the same technique to estimate again very precise the mass of the comet after perihelion. The comparison of both mass values results in the mass loss of 67P/Churyumov-Gerasimenko during its perihelion passage.

The gravity field of the comet was also estimated in spherical harmonics from the 2014 data and from the 2016 data. The gravity field coefficients are linked with the main moments of inertia of the comet and provides consequently information about its internal structure. It was concluded from 2014 results that no large voids exist inside 67P, i.e. the density is homogeneously distributed. No significant difference was found between the main moments of inertia before and after perihelion.
